

Claims

[c1] What is claimed is:

1. A method of determining whether a virtual address corresponds to a physical address in a translation lookaside buffer (TLB), the virtual address comprising a plurality of bits, the translation lookaside buffer (TLB) comprising a plurality of tag addresses and page types, and the physical addresses corresponding to each tag address, the method comprising:

- (a) receiving the virtual address;
- (b) setting the page type of the virtual address according to the rank of the page types;
- (c) fetching index bits and a tag compared address from the page type;
- (d) comparing the page type of the virtual address in step (b) and the tag compared address in step (c) with the page types and the tag addresses in the TLB; and
- (e) determining the rank of the page type if the page type of the virtual address in step (b) and the tag compared bits in step (c) correspond with a page type and a tag address in the TLB.

[c2] 2. The method of claim 1 further comprising searching

for a page type in the TLB corresponding to the set page type of the virtual address and an index address for comparing the page type with the tag compared address according to the index bits of the virtual address.

- [c3] 3. The method of claim 1 wherein determining the rank of the page type in step (e) comprises raising the rank of the page type of the virtual address if the page type of the virtual address set in step (b) corresponds with a page type in the TLB, if the tag compared address in step (c) corresponds with the tag address in the TLB, and if the rank of the page type of the virtual address in step (b) is not the highest.
- [c4] 4. The method of claim 3 wherein the rank of the page type of the virtual address is raised by one level if the page type of the virtual address set in step (b) corresponds with a page type in the TLB, if the tag compared address in step (c) corresponds with the tag address in the TLB, and if the rank of the page type of the virtual address in step (b) is not the highest.
- [c5] 5. The method of claim 1 wherein determining the rank of the page type in step (e) comprises following steps:
 - (i) calculating a number of times in which the set page type of the virtual address in step (b) corresponds with a page type in the TLB; and

(ii) raising the rank of the page type according to the calculated number.

- [c6] 6. The method of claim 1 wherein determining the rank of page type in step (e) utilizes a sorting method of a 2-bit counter.
- [c7] 7. The method of claim 1 wherein setting the page type of the virtual address according to the rank of the page type in step (b) comprises setting the page type of the virtual address to be a page type with higher rank.
- [c8] 8. A determining device for determining whether a virtual address corresponds to a physical address in a TLB, comprising:
 - a mask selecting module used for receiving the virtual address and outputting a part of the bits of the virtual address and a page type signal according to a rank of a page type;
 - a translation lookaside module comprising:
 - a TLB used for storing a plurality of index addresses and a plurality of page types;
 - a tag address comparing module used for checking whether the part of bits outputted by the mask selecting module corresponds with an index stored in the TLB; and
 - a page type comparing module used for checking whether the page type signal outputted by the mask se-

lecting module corresponds with a page type stored in the TLB; and

a rank generating module used for generating the ranks of the plurality of the page types in the TLB according to the checking result of the page type comparing module.

- [c9] 9. The determining device of claim 8 wherein the rank generating module sets the ranks of the page types in the TLB according to the number of times the page type signal corresponds to the one of the page types in the TLB.
- [c10] 10. The determining device of claim 8 wherein the rank generating module is used for raising the rank of the page types in the TLB if the page type signal corresponds to the one of the page types in the TLB and if the corresponding rank of the page type is not the highest.